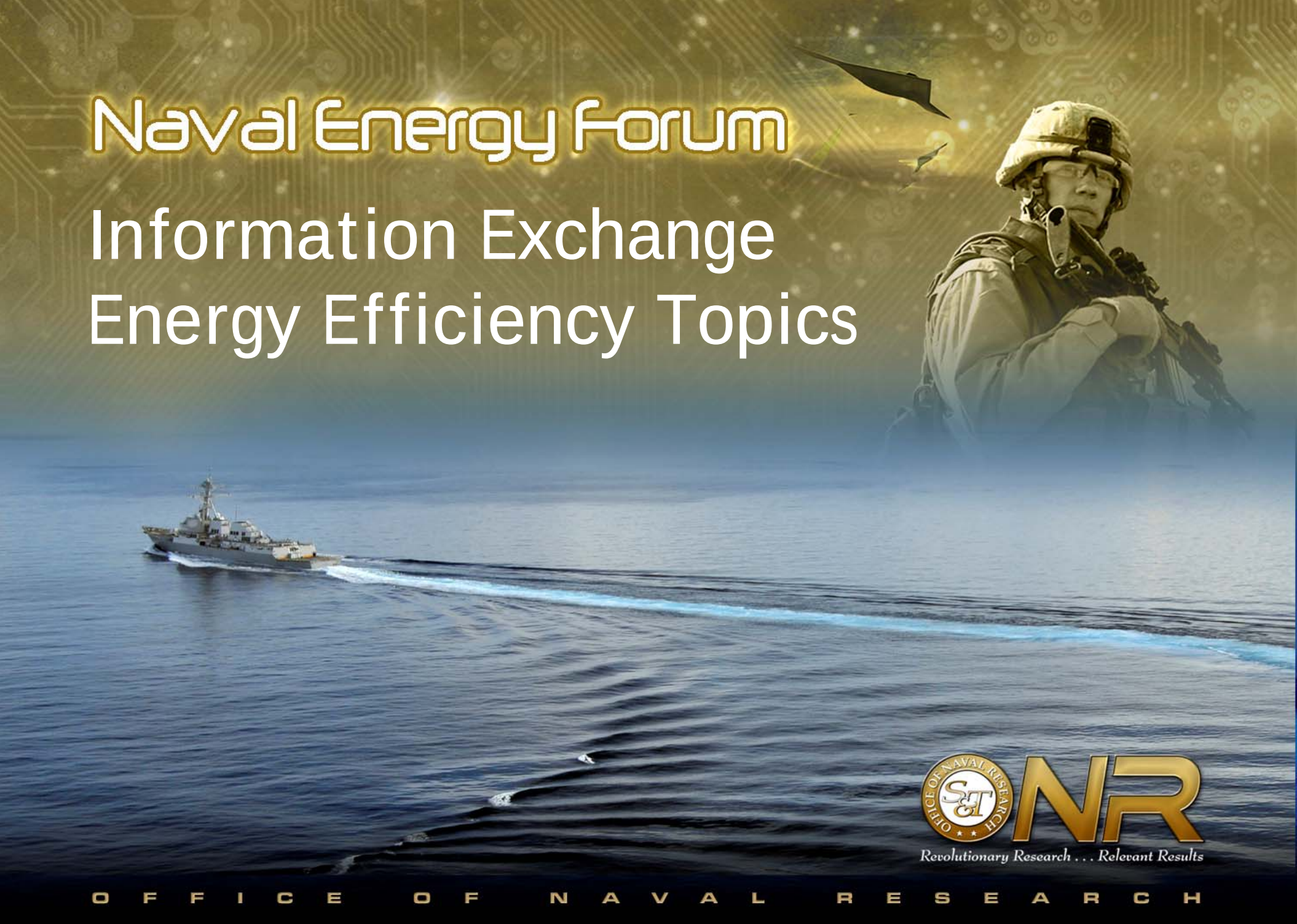
Naval Energy Forum

Information Exchange
Energy Efficiency Topics



Revolutionary Research . . . Relevant Results

OFFICE OF NAVAL RESEARCH

Energy Efficiency

What is Energy Efficiency?

Energy efficiency is reducing Navy energy consumption while maintaining or enhancing mission effectiveness.

It is focused on immediate conservation efforts, mid-term technology modifications and long-term acquisition decisions.

Why does it matter?

Increasing energy efficiency reduces costs, extends the tactical reach and meets additional energy demands imposed by new capabilities.

What will the Navy do?

Develop, rapidly adopt and procure more efficient technologies.

Adapt operational policy and doctrine that recognize the role of energy as a strategic asset.

Increase energy awareness and encourage conservation practices among Navy leadership and personnel.

Ashore Energy Efficiency

Warfighter Benefits

- **Efficiency diagnostics and innovative approaches to meet energy goals**
- **Retrofits that deliver the optimal financial return and energy benefit**
- **Availability of new materials that increase energy efficiency**
- **Efficiencies that have won 30% of Presidential/Federal Energy Awards issued during the last 9 years**

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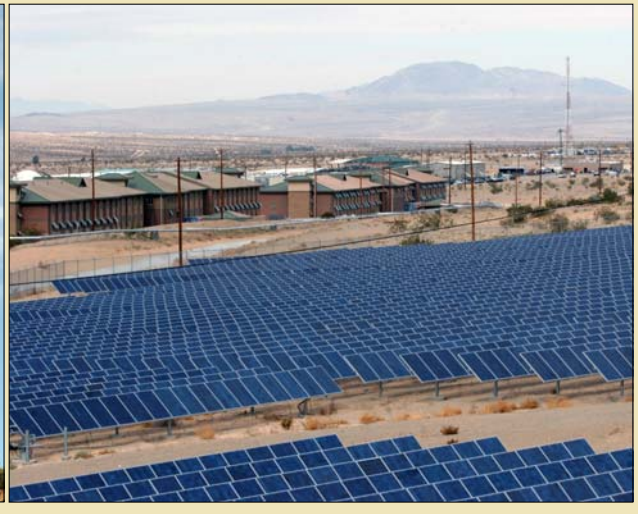

DoN is using all available mechanisms and sources to meet its energy goals

- Resource Efficiency Managers enable a systematic and holistic approach to managing energy, water, environmental and financial resources
- Navy utilizes funding from the Energy Conservation Investment Program, MILCON and ARRA

Existing and future infrastructure will be built in the most energy efficient manner possible

- NAVFAC Southeast awarded $3.2M for energy conservation projects aimed at reducing energy consumption onboard Naval Air Station Meridian
- NAVFAC Hawaii and ECIP awarded $569,860 to install high-tech occupancy sensors to reduce energy consumption in 54 buildings at Naval Station Pearl Harbor
- DoN awarded 3 contracts totaling $31M for advanced metering projects at Naval Station Everett, Naval Air Station Whidbey Island and Naval Base Kitsap

DoN partnerships yield Smart Grid technology and the Net-Zero Installation program

- Navy partnered with DOE for implementation of the Net Zero Energy Installation program
- A $1.3M NAVFAC – NREL project prioritizes renewable energy opportunities and utilizes NREL implementation decision tools
- Philadelphia Navy Yard will build Smart Grid to aid in its electric ship construction project

Aviation Energy Efficiency

Warfighter Benefits

- Energy efficient technologies
- An energy conscious culture
- Implementation of best practices

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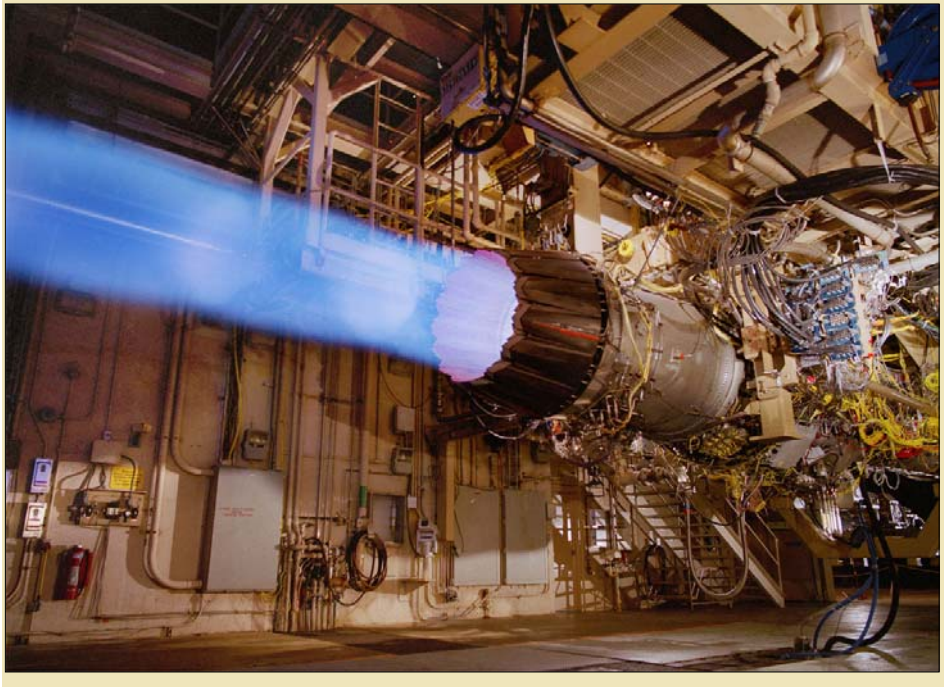

DoN is improving aircraft energy efficiency through technology initiatives

- Demonstrating F/A-18 E/F – F414 engine efficiency technologies
- Developing Naval Variable Cycle Engine Technology – Proposed FY12 Innovative Naval Prototype
- Reducing drag and weight through aerodynamic optimization and advanced materials

DoN is cultivating an energy conscious culture

- Increasing energy awareness at all levels
- Incentivizing development and use of energy efficient practices
- Implementing energy efficiency Key Performance Parameter for future platform acquisitions

DoN is promulgating energy efficient best practices

- Socializing operational best practices across the fleet
- Expanding the use of alternatives to live training
- Expanding the use of efficient unmanned platforms

Environmental Energy Efficiency

Warfighter Benefits

- **Maintaining or enhancing mission effectiveness while reducing energy consumption and decreased environmental impacts while**
- **$99 million in fuel cost avoidance during first three quarters of FY09 through the Incentivized Energy Conservation (i-ENCON) Program**

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DoN is reducing its carbon footprint through materiel efficiencies

- New ships, aircraft and expeditionary systems will feature improved energy efficiency
- Increase energy efficiency in existing ships, aircraft and expeditionary systems through the implementation of more energy efficient technologies
- Build clean energy systems with net-zero effect on the environment while also meeting Naval energy demand

DoN is reducing its carbon footprint through training and education

- Continually examine operations aimed at fostering best practices for using energy more efficiently
- Stress the importance of the individual Marine's or Sailor's participation in energy conservation
- Encourage personnel to identify issues and recommend solutions to reduce energy usage
- Invest in long-term solutions by providing tools and instruction on energy conservation techniques
- Promulgate awareness that energy is a critical strategic asset

Expeditionary Energy Efficiency

Warfighter Benefits

- **Improvements in tactical vehicle engines and power generation**
- **Reduction of base camp energy usage through technology improvements**
- **Utilization of simulators to increase training efficiencies and reduce fuel usage**

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DoN is improving tactical fuel efficiency

- Petroleum-based fuel consumption and total ownership cost are key procurement considerations
- Fuel efficiency goals have been implemented for High Mobility Multipurpose-Wheeled Vehicles (HMMWV), Joint Light Tactical Vehicles (JLTV), Medium Tactical Vehicle Replacements (MTVR) and light anti-armor vehicles (LAAV)
- Environmental control units and generator sets are reducing power requirements, yielding fuel savings and increasing electrical output
- Landing Craft Air Cushion (LCAC) shaft balancing and torque meters aid in achieving fuel goals

DoN is optimizing the energy consumption of expeditionary tent camps

- Alternative power generation protects warfighters against vulnerability of traditional energy sources
- Smart Grid technologies optimize assets and energy reliability
- Increased R-values in habitable facilities are achieved through the use of more effective insulation

DoN is leveraging improvements in simulator technology to reduce fuel usage

- Reduce fuel usage via a broad spectrum of high fidelity trainers that replicate operating environments
- LCAC desktop simulators facilitate entire crew training
- Full-scale Convoy training systems improve crew skills

Fuels Energy Efficiency

Warfighter Benefits

- Reduced fuel consumption while maintaining or enhancing mission effectiveness
- Clean energy through alternative fuels
- Improved fuel performance
- Reduced fuel costs

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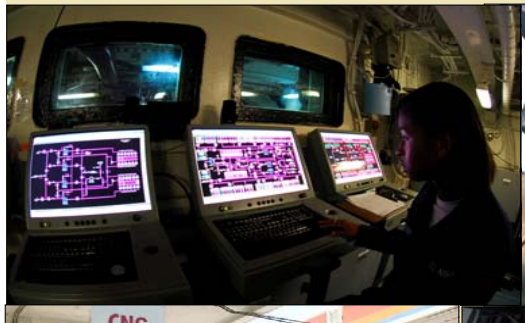

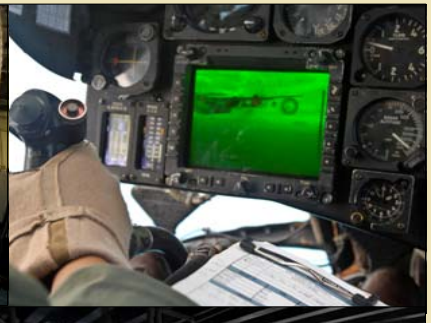

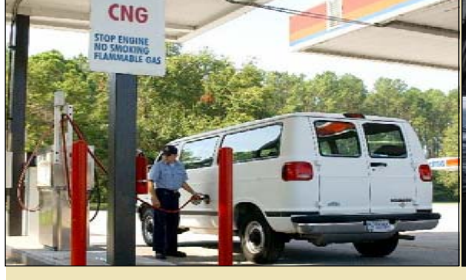

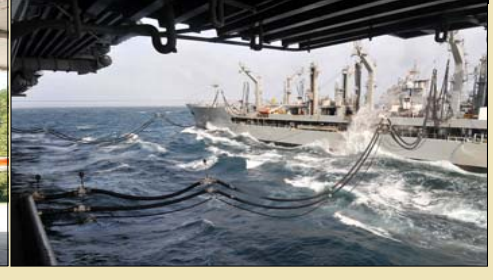

The Navy Energy Strategy focuses on improving efficiency through a variety of means

- Promotes increased fuel performance
- Fosters a reduction of tactical petroleum consumption
- Encourages use of available alternative fuels and innovative development of new fuels

Warfighters have achieved increased fuel efficiency by adopting fuel saving procedures

- The Incentivized Energy Conservation (i-ENCON) program won the prestigious White House Presidential Award for Outstanding Federal Energy Management in 2002
- During FY08, 148 ships cumulatively saved more than 1 million barrels of oil — enough to fuel more than 3.5 million cars
- During FY09, 120 ships realized fuel savings totaling $99 million — enough to fuel 21 Arleigh Burke class destroyers
- Use of a new stern flap technology decreases fuel costs through increased hydrodynamics

Achieving fuels efficiency aids the Navy's support of the nation's Maritime Strategy

- Long term fuel reduction solutions enable the mission requirements when fuel prices are elevated and when they are stabilized
- "Smart steaming" engineering procedures and guidelines ensure maximum fuel efficiency without impairing mission objectives
- Fleet Readiness, Research and Development Program (FRR&DP) initiatives are yielding significant cost avoidance

Maritime Energy Efficiency

Warfighter Benefits

- Efficiency improvements are introduced into current fleet via technology insertion
- Energy efficiency is driven into new platform, weapons and sensors programs
- Ongoing, successful energy culture change efforts are continued

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DoN is incorporating energy efficient designs, architectures and technologies into new platforms, weapons and sensors

- Fully integrated and hybrid power systems enable more efficient loading of prime movers
- Investigating combined diesel and gas turbine plants and podded propulsion for new designs
- High Efficiency Chiller is standard for all future classes

DoN is introducing energy efficient technologies into the current fleet

- The Fleet Readiness Research & Development Program (FRR&DP) has 5 energy-efficient technologies under evaluation on 7 ships; evaluating additional technologies
- Hybrid Electric Drive (HED) is in the design phase for potential back-fit into Arleigh Burke class (DDG-51) guided missile destroyers
- MSC and OPLOG Energy Conservation Programs currently have 9 initiatives being evaluated on 5 Naval Fleet Auxiliary ships

DoN is expanding current efforts and introducing new ones to continue the energy culture change

- Incentivized Energy Conservation (i-Encon) to begin training with focus on energy efficiency at battle group level
- Provide total ship energy awareness using Energy Dashboard